Weekly Report – Sindhuja Chaduvula

I have created several collision scenarios in SUMO, featuring accidents between the DEFAULT VEHICLE and EGO VEHICLE. Below are the specifics of these setups,

Output Files

Also I have generated different output files for all these scenarios such as:
Floating Car Data(FCD) output, Full output, Collision output, Lane change output, Statistics output, Summary output.

Floacting Car Data(FCD): This provides detailed trajectory data of specific vehicles (often sample vehicles) throughout their trips. It's akin to having a GPS tracker on selected cars, allowing you to monitor their movements.

Full Output: Records comprehensive details about every vehicle in the simulation at every time step, including position, speed, lane, etc. It's the most granular level of output, capturing all vehicular details.

Collision Output: Logs information about each collision that occurs in the simulation, including the involved vehicles, time, location, and type of collision. Essential for understanding and analyzing accidents in your scenario.

Lane Change Output: Documents every lane change event made by vehicles. It includes details like the reason for the lane change, the vehicles involved, and the time and location of the lane change. Useful for analyzing driving behaviors and traffic flow dynamics.

Statistics Output: Aggregates data to give an overview of the simulation's performance, such as the total number of vehicles, average travel time, and other macro-level metrics. Handy for gauging the overall efficiency and effectiveness of the traffic scenario.

Summary Output: Provides a condensed report of the simulation’s progress at regular intervals, capturing key metrics like the number of running vehicles, waiting times, and total distance traveled. It gives a snapshot view of the simulation's state at various moments.

Each of these outputs offer a different perspective on the simulation, enabling diverse analysis ranging from individual vehicle behaviors to holistic traffic systems.

Simulation of traffic collisions in Roundabout:

Step length	0.80sec
Collision.action	remove
Collision.stoptime	2sec

In our roundabout, I have taken a step length of 0.80 seconds, because a smaller step length means vehicles move in shorter steps, allowing for frequent collision checks and better positioning. This precision improves the models' accuracy and leads to safer interactions, especially in dense traffic. However, it also slows down the simulation's computation.

Flow Parameters

In a simulation scenario, two distinct vehicle types, DEFAULT_VEHTYPE and EGO_VEHTYPE, traverse predefined routes between points -E29 to E31 and -E32 to E30. Both the default vehicle flows commence at the 0-second mark and operate at a rate of 1800 vehicles per hour, ending at 200 seconds.

Parameters	**Values**
begin	0 seconds
end	200 seconds
vehsPerHour	1800 vehicles/hour

SCENARIO 1: Collision happened between EGO VEHICLE and DEFAULT VEHICLE during Insertion in a roundabout

The reason for this collision at the insertion is because of the flow rate. If many vehicles are trying to enter the simulation within a short period, the chance of insertion collisions increases. In my case the EGO VEHICLES are also inserted within a 5seconds difference and the EGO VEHICLES and DEFAULT VEHICLES will be continue to be inserted until 200 seconds into the simulation. VehsPerHour specifies the number of vehicles that will be introduced into the simulation per hour from this flow during the interval between begin and end. So for every minute 30 vehicles are inserted into the simulation which is causing the insertion collision.

Attributes of Default Vehicles that are changed

Parameters	**Value**	**Reason**
Decel	2.0m/s2	If vehicles cannot brake quickly, when a vehicle tries to insert itself
Accel	3.6m/s2	Higher acceleration might have reduced traction in conditions that aren't ideal.
tau	0.2	A small tau means vehicles follow each other more closely
maxspeed	25	Ideal speed
sigma	0.9	A higher value indicates driver is more imperfect or unpredictable.
Color	Yellow	
CarFollowModel	Kraus	

Attributes of EGO Vehicles that are changed

Parameters	**Value**	**Reason**
impatience	1.00	Impatient drivers are more likely to engage in aggressive maneuvers
lcpushy	1.00	very aggressive behavior in lane changing

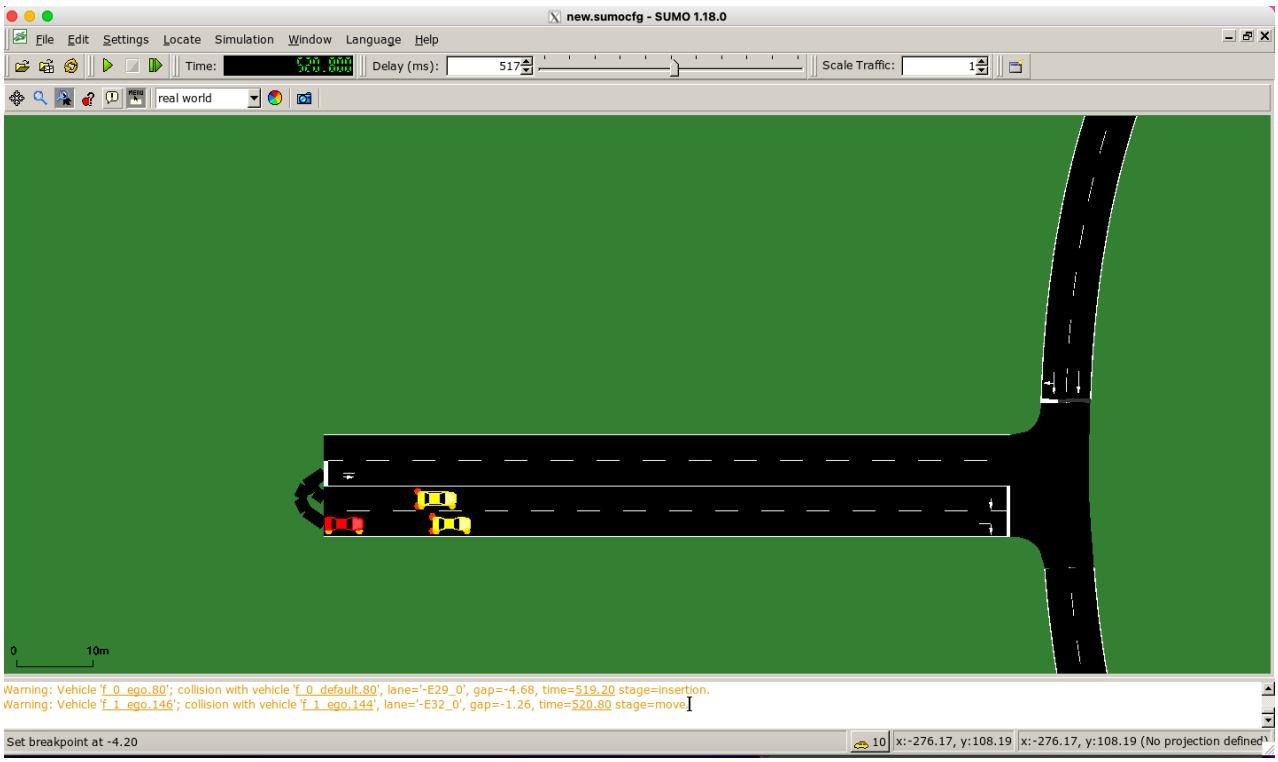
tau	0.5	A higher value means slower reactions,potentially increasing collision risk.
sigmagap & sigmaeror	0.8	variability and error in the car-following model
CarFollowModel	EIDM	
Color	Red	

Output

Below Image shows collision between the EGO VEHICLE(Red color) and DEFAULT VEHICLE(yellow color) during insertion into the round about.

Warning Output:

Parameter	**Value**
Affected Vehicle	f_0_default.80
Collision Vehicle	f_0_ego.80
Lane	-E29_0
Gap	-4.68m
Time	519.20s
Stage	Insertion
Warning type	Warning



SCENARIO 2: Collision happened between EGO VEHICLE and DEFAULT VEHICLE while moving in a roundabout

In this case a collision is happened between the EGO VEHICLE that follows EIDM car model and while moving with the DEFAULT VEHICLE that follows the Krauss model. The stage of the collision is called "move" indicating that both the vehicles where in motion when the incident occurred.

Attributes of default vehicles remained same whereas some attributes of ego vehicle is changed.

Attributes of EGO Vehicles that are changed

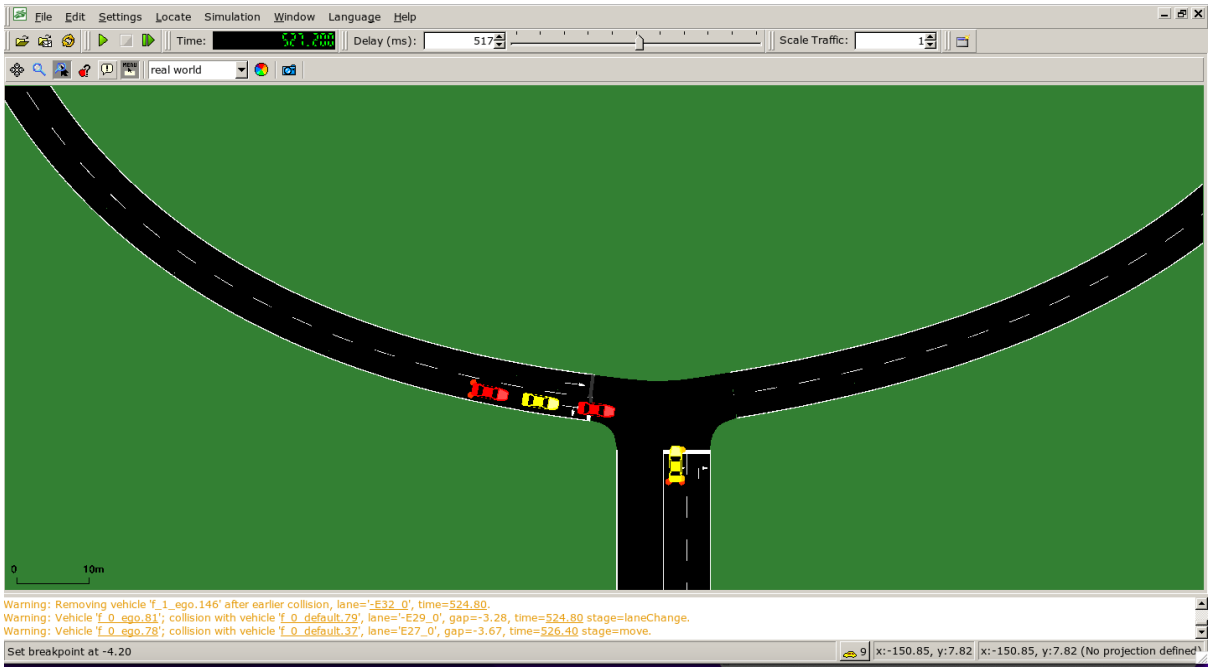
Parameters	**Value**	**Reason**
impatience	1.00	Impatient drivers are more likely to engage in aggressive maneuvers
lcpushy	1.00	very aggressive behavior in lane changing
tau	0.5	A higher value means slower reactions,potentially increasing collision risk.
sigmagap & sigmaeror	0.8	variability and error in the car-following model
CarFollowModel	EIDM	
Color	Red	
eidmaccfactor	1.2	This parameter can influence how closely and aggressively the ego vehicle follows other cars.

Output

Below Image shows collision between the EGO VEHICLE(Red color) and DEFAULT VEHICLE(yellow color) during moving in the round about.

Warning Output:

Parameter	**Value**
Affected Vehicle	f_0_default.37
Collision Vehicle	f_0_ego.78
Lane	E27_0
Gap	-3.67m
Time	526.40s
Stage	Move
Warning type	Warning



SCENARIO 3: Collision happened between EGO VEHICLE and DEFAULT VEHICLE while lane changing in a roundabout.

In this case a collision is happened between the EGO VEHICLE that follows EIDM car model and while changing the lane with the DEFAULT VEHICLE that follows the Krauss model in a roundabout. In the simulation, while inside a roundabout, the EGO VEHICLE attempted a lane change and collided with the DEFAULT VEHICLE. The event's categorization as "lanechange" signifies that the incident transpired during the act of changing lanes. This highlights potential misjudgment or aggressive maneuvers during lane alterations, leading to unsafe interactions between the two vehicles.

Attributes of EGO Vehicles that are changed

Parameters	**Value**	**Reason**
lanechangemodel	LC2013	A model being used for lane changes.
lcpushy	1.00	very aggressive behavior in lane changing
tau	0.5	A higher value means slower reactions,potentially increasing collision risk.
sigmagap & sigmaeror	0.8	variability and error in the car-following model
CarFollowModel	EIDM	
Color	Red	
lcstrategic	-1.0	vehicle won't consider strategic reasons for lane changes, like preparing for an upcoming exit

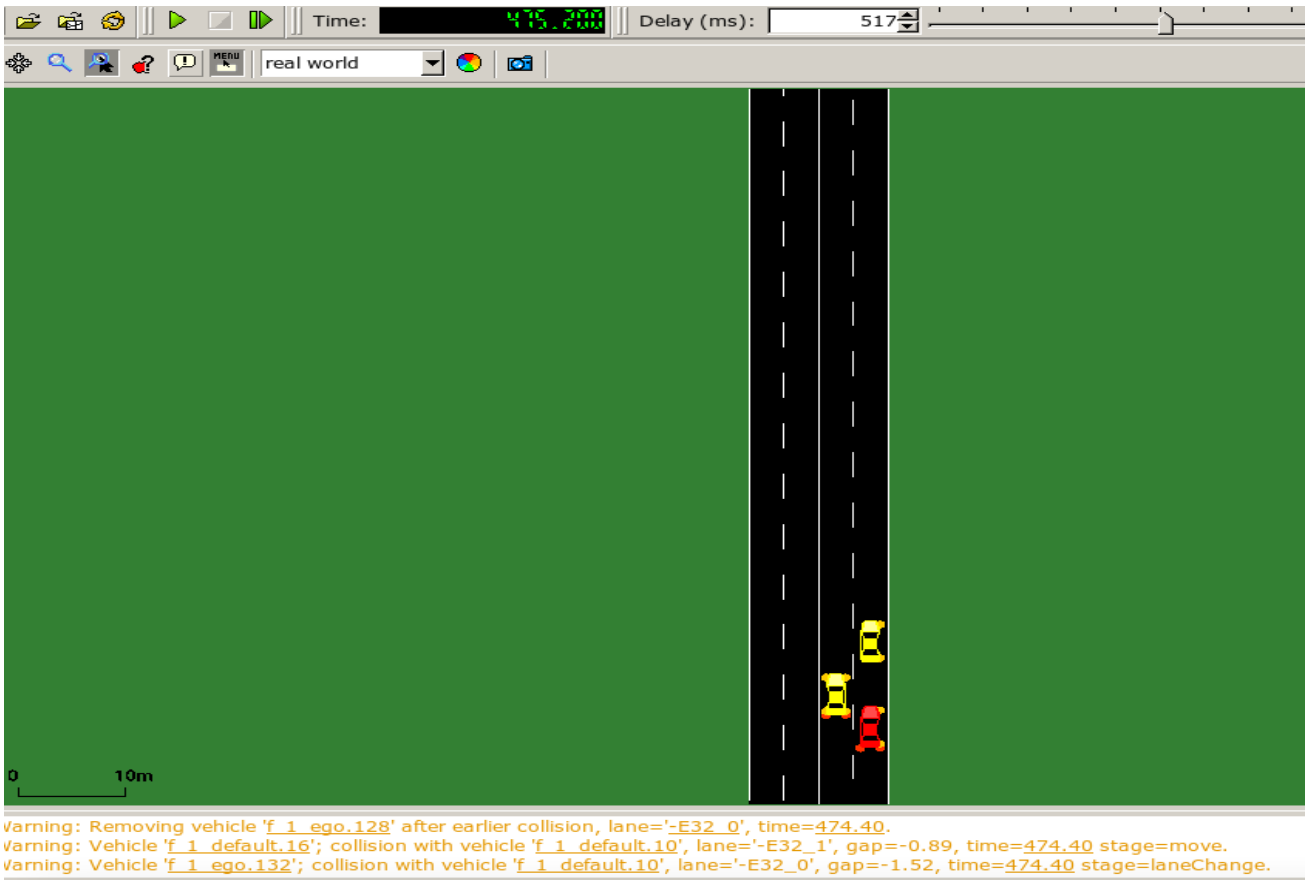
lcCooperative	-1.0	vehicle doesn't cooperate with other vehicles when trying to change lanes
lcSpeedGain	0.0	vehicle won't change lanes to gain speed
lcimpatience	1.0	vehicle's impatience when changing lanes

Output

Below Image shows collision between the EGO VEHICLE(Red color) and DEFAULT VEHICLE(yellow color) during changing the lane in the round about.

Warning Output:

Parameter	**Value**
Affected Vehicle	f_1_default.10
Collision Vehicle	f_1_ego.132
Lane	-E32_0
Gap	-1.52m
Time	474.40s
Stage	Lane change
Warning type	Warning



SCENARIO 4: Junction Collision happened between EGO VEHICLE and EGO VEHICLE while moving in a junction in a roundabout.

In this case a junction collision is happened between the EGO VEHICLE that follows EIDM car model and while changing the lane with the EGO VEHICLE in a roundabout. The incident, classified as a "junction collision", occurred while both vehicles were in motion, as indicated by the "move" stage. This points to a potential oversight or misjudgment in yielding or gap assessment by the vehicles while entering or navigating the roundabout junction.

Attributes of EGO Vehicles that are changed

Parameters	**Value**	**Reason**
decel	2.00m/s2	If this is too low, the vehicle might not be able to stop quickly enough when a collision is imminent at a junction.
impatience	1.00	Impatient drivers are more likely to engage in aggressive maneuvers
lcpushy	1.00	very aggressive behavior in lane changing
tau	0.5	A higher value means slower reactions,potentially increasing collision risk.
sigmagap & sigmaeror	0.8	variability and error in the car-following model
CarFollowModel	EIDM	
Color	Red	
jmIgnoreFoeProb	0.8	indicates an 80% probability that the ego vehicle will ignore other vehicles (foes) at a junction

Output

Below Image shows junction collision between the EGO VEHICLE(Red color) and EGO VEHICLE(red color) during changing the lane in the round about.

Warning Output:

Parameter	**Value**
Affected Vehicle	f_0_edge.3
Collision Vehicle	f_0_ego.7
Lane	J4_0_0
Gap	-5.29m

Time	48.00s
Stage	move
Warning type	Warning